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OPENING ADDRESS

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On behalf of the Organizing Committee I would like to extend a hearty welcome to all participants of this meeting. This is the 15th International Conference on the Physics of Semiconductors sponsored by the International Union of Pure and Applied Physics. This meeting has been organized by the Science Council of Japan and the Physical Society of Japan. I would like to express my deepest appreciation for their contributions as well as for the scientific advise and cooperation given by many friends from all over the world. We are also much indebted to the financial support from domestic industries and the foundations as well as Japanese Government. Without this kind cooperation we could not have arranged this Conference.

The first meeting of this Conference was held at Reading in 1950, just after the invention of transistor. From then on, the developement of the Conference has been quite synchronous with the developement of the semiconductor industry. The main topics in the earlier days were linear and nonlinear transport phenomena as well as physics and chemistry in the crystal growth technology of silicon and germanium. In the 1960's, when the transistor industry expanded explosively on the well established foundation of semiconductor physics, so many sophisticated experiments such as electron nuclear double resonance(ENDOR), cyclotron resonance, optics as well as magneto-optics over wide range of wavelength and so on became available for the exploration of the electronic behavior in elemental and compound semiconductors. They were almost always successfully refered to the modern theoretical techniques based on the Bloch theory.

These scientific achievements have called for an innovation in solid state electronics, realizing Gunn diode, MOS-transistor, solar cell, light emitting diode, semiconductor laser, and so forth, while the information obtained by these experimental and theoretical investigations has been indispensable to designing solid state device. However, too much sophistication is worried as an evidence of lack of vitality in the semiconductor physics. The view was indeed expressed by Prof. Pierre Aigrain in the closing address at Paris Conference in 1964.

Fortunately, the tide has been changing these years. The incentive is again comming from industry. The low dimensional materials have been attracting many research workers in the expectation of realizing high T_c supercoductor. The quasi-two-dimensinal space charge layer employed in MOS-transistor has proved to be an interesting system of physics. The amorphous semiconductors based on silcon and chalcogenides have been widely investigated because of the industrial requirement as well as of the excitement to a spiritual adventure into a new frontier of physics. The developements of the study on the reconstruction of the physical surfaces of semiconduct-

ing crystals and that of the structure of deep impurity states are primarily arising from the technological interest. The investigation of these problems compel us to discard the simple Bloch theory in which electrons are assumed running around on the stage of a rigid periodic lattice. We have to realize the fact that the crystal lattice is virtually sustained by electrons just as the electrons are sustained by lattice. The Anderson's negative correlation energy in amorphous semiconductors is another example of this kind of effect. The Peierls type phase transition in such one-dimensional materials as TTF-TCNQ, some two-dimensional materials as transition metal chalcogenides and also three-dimensional IV-VI compounds offer the typically interesting case where we have to treat the electrons and lattice on an equal footing.

In this Conference you will see another remarkable example of the effect of electrons on cohesion of crystal in the session of laser annealing which is one of the most recent powerful techniques in the semiconductor industry. We have also prepared a Special Session on the Interface between Appied and Basic Problems of Semiconductor Physics. The microdefects in silicon wafer in the very large scale integrated circuit technology and the degradation in semiconductor laser will be discussed there. These problems will also stimulate the appetite of the ambitious physicists. I expect that semiconductor physics in new field which are full of vitality though not yet sophisticated will shoot up from these seeds of discussion. I shall even dare to predict that this Conference will be remembered as a turning point in the physics of semiconductors.

I am only afraid to say that you will have no time to enjoy this lovely historic city of Kyoto, since I am sure you will all be fascinated and engrossed in the stimulating talk which will now start.